



[4910-13-P]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2018-0314; Product Identifier 2018-NE-11-AD; Amendment 39-19255; AD 2018-08-02]

RIN 2120-AA64

Airworthiness Directives; Rolls-Royce plc Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule; request for comments.

SUMMARY: We are adopting a new airworthiness directive (AD) for all Rolls-Royce plc (RR) Trent 1000-A2, Trent 1000-AE2, Trent 1000-C2, Trent 1000-CE2, Trent 1000-D2, Trent 1000-E2, Trent 1000-G2, Trent 1000-H2, Trent 1000-J2, Trent 1000-K2, and Trent 1000-L2 turbofan engines. This AD requires initial and repetitive inspections of the intermediate-pressure compressor (IPC) stage 1 rotor blades, IPC stage 2 rotor blades, and IPC shaft stage 2 dovetail posts, and removing any cracked parts from service. This AD was prompted by IPC blade separations resulting in engine failures. We are issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER].

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER].

We must receive comments on this AD by [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: You may send comments, using the procedures found in 14 CFR 11.43 and 11.45, by any of the following methods:

- Federal eRulemaking Portal: Go to <http://www.regulations.gov>. Follow the instructions for submitting comments.
- Fax: 202-493-2251.
- Mail: U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC 20590.
- Hand Delivery: U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE., Washington, DC 20590, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

For service information identified in this final rule, contact Rolls-Royce plc, Corporate Communications, P.O. Box 31, Derby, England, DE24 8BJ; phone: 011-44-1332-242424; fax: 011-44-1332-249936; email: corporate.care@rolls-royce.com. Internet: <https://customers.rolls-royce.com/public/rollsroycecare>. You may view this service information at the FAA, Engine & Propeller Standards Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call 781-238-7759. It is also available on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2018-0314.

Examining the AD Docket

You may examine the AD docket on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2018-0314; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, the mandatory continuing airworthiness information (MCAI), the regulatory evaluation, any comments received, and other information. The street address for Docket Operations (phone: 800-647-5527) is listed above. Comments will be available in the AD docket shortly after receipt.

FOR FURTHER INFORMATION CONTACT: Kevin M. Clark, Aerospace Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: 781-238-7088; fax: 781-238-7199; email: kevin.m.clark@faa.gov.

SUPPLEMENTARY INFORMATION:

Discussion

The European Aviation Safety Agency (EASA), which is the Technical Agent for the Member States of the European Community, has issued EASA AD 2018-0084, dated April 13, 2018 (referred to after this as the MCAI), to address an unsafe condition for the specified products. The MCAI states:

Occurrences were reported on RR Trent 1000 ‘Pack C’ engines, where some IPC Rotor 1 and Rotor 2 blades were found cracked.

This condition, if not detected and corrected, could lead to in-flight blade release, possibly resulting in reduced control of the aeroplane.

To address this potential unsafe condition, RR initially issued Alert NMSB TRENT 1000 72-AJ814 and 72-AJ819 to provide inspection instructions for IPC Rotor 1 blades, and IPC Rotor 2 blades and IPC shaft Stage 2 dovetail posts, respectively. RR also issued NMSB TRENT 1000 72-J871 to provide rework instructions for the affected parts, and Alert NMSB TRENT 1000 72-AJ869 to inspect those post-rework parts. Consequently, EASA issued AD 2017-0248 to require repetitive inspections of the affected IPC Rotor blades and IPC shaft Stage 2 dovetail posts and, depending on findings, removal from service of the engine for corrective action.

After that [EASA] AD was issued, prompted by further analysis, it was determined that, for certain engines, the front face of IPC Rotor 2 Blades and the dovetail posts of the IPC Shaft Stage 2 Rotor assembly needed to be inspected earlier. RR issued Alert NMSB TRENT 1000 72-AK058 to provide instructions for a one-time on-wing inspection. Consequently, EASA issued AD 2018-0073, retaining the requirements of EASA AD 2017-0248, which was superseded, to require an additional borescope inspection of certain engines and, depending on findings, removal from service of the engine for corrective action.

Since that [EASA] AD was issued, it was determined that repetitive borescope inspections are necessary on all engines to ensure fleet-wide continued safe operation. Consequently, RR revised Alert

NMSB TRENT 1000 72-AJ869, Alert NMSB TRENT 1000 72-AJ814, Alert NMSB TRENT 1000 72-AJ819 and NMSB TRENT 1000 72-J871, and issued the NMSB to consolidate all inspection instructions.

For the reason described above, this [EASA] AD retains the requirements of EASA AD 2018-0073, which is superseded, and requires repetitive on-wing borescope inspections of the affected Rotor 1 and Rotor 2 parts and, depending on findings, removal from service of the engine for corrective action. This [EASA] AD also introduces specific requirements for engines installed on aeroplanes involved in ETOPS, and inspection following operation in asymmetric power conditions.

You may obtain further information by examining the MCAI in the AD docket on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2018-0314.

Related Service Information under 1 CFR Part 51

We reviewed RR Alert Non-Modification Service Bulletin (NMSB) Trent 1000 72-AJ819, Revision 2, dated April 12, 2018, and RR Alert NMSB Trent 1000 72-AK060, dated April 13, 2018. RR Alert NMSB Trent 1000 72-AJ819 describes procedures for performing a visual borescope inspection of the IPC stage 2 rotor blades and IPC shaft stage 2 dovetail posts. RR NMSB Trent 1000 72-AK060 defines the initial inspection threshold and repeat inspection intervals for Trent 1000 IPC stage 1 blade, stage 2 blade and IPC shaft stage 2 dovetail posts. This service information is reasonably available because the interested parties have access to it through their normal course of business or by the means identified in the ADDRESSES section.

FAA's Determination

This product has been approved by EASA and is approved for operation in the United States. Pursuant to our bilateral agreement with the European Community, EASA has notified us of the unsafe condition described in the MCAI and service information referenced above. We are issuing this AD because we evaluated all the relevant

information provided by EASA and determined the unsafe condition described previously is likely to exist or develop in other products of the same type design.

AD Requirements

This AD requires initial and repetitive inspections of the IPC stage 1 rotor blades, IPC stage 2 rotor blades, and IPC stage 2 shaft dovetail posts, and removing any cracked parts from service.

Interim Action

We consider this AD interim action. RR is developing a modification which is expected to be terminating action for the repetitive inspections required by this AD.

FAA's Justification and Determination of the Effective Date

An unsafe condition exists that requires the immediate adoption of this AD without providing an opportunity for public comments prior to adoption. The FAA has found that the risk to the flying public justifies waiving notice and comment prior to adoption of this rule because the compliance time for the action is less than the time required for public comment. The FAA has reviewed and agrees with EASA's determination that certain affected IPC rotor blades and dovetail posts must be inspected and, if needed, replaced with a part eligible for installation prior to further flight. Failure to inspect and replace these parts within the required compliance times could lead to failure of the IPC, failure of one or more engines, loss of thrust control, and loss of the airplane. Therefore, we find good cause that notice and opportunity for prior public comment are impracticable. In addition, for the reason stated above, we find that good cause exists for making this amendment effective in less than 30 days.

Comments Invited

This AD is a final rule that involves requirements affecting flight safety and was not preceded by notice and an opportunity for public comment. However, we invite you to send any written data, views, or arguments about this final rule. Send your comments

to an address listed under the ADDRESSES section. Include the docket number FAA-2018-0314 and Product Identifier 2018-NE-11-AD at the beginning of your comments. We specifically invite comments on the overall regulatory, economic, environmental, and energy aspects of this final rule. We will consider all comments received by the closing date and may amend this final rule because of those comments.

We will post all comments we receive, without change, to <http://www.regulations.gov>, including any personal information you provide. We will also post a report summarizing each substantive verbal contact we receive about this final rule.

Costs of Compliance

We estimate that this AD affects 28 engines installed on airplanes of U.S. registry.

We estimate the following costs to comply with this AD:

Estimated costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
Inspect IPC blade and dovetail post	6 work-hours X \$85 per hour = \$510	\$0	\$510	\$14,280

Authority for This Rulemaking

Title 49 of the United States Code specifies the FAA’s authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. “Subtitle VII: Aviation Programs,” describes in more detail the scope of the Agency’s authority.

We are issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: “General requirements.” Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds

necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

This AD is issued in accordance with authority delegated by the Executive Director, Aircraft Certification Service, as authorized by FAA Order 8000.51C. In accordance with that order, issuance of ADs is normally a function of the Compliance and Airworthiness Division, but during this transition period, the Executive Director has delegated the authority to issue ADs applicable to engines, propellers, and associated appliances to the Manager, Engine and Propeller Standards Branch, Policy and Innovation Division.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify this AD:

- (1) Is not a “significant regulatory action” under Executive Order 12866,
- (2) Is not a “significant rule” under the DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979),
- (3) Will not affect intrastate aviation in Alaska, and
- (4) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

Adoption of the Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39 - AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

2. The FAA amends § 39.13 by adding the following new airworthiness directive (AD):

2018-08-02 **Rolls-Royce plc**: Amendment 39-19255; Docket No. FAA-2018-0314; Product Identifier 2018-NE-11-AD.

(a) Effective Date

This AD is effective [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER].

(b) Affected ADs

None.

(c) Applicability

This AD applies to all Rolls-Royce plc (RR) Trent 1000-A2, Trent 1000-AE2, Trent 1000-C2, Trent 1000-CE2, Trent 1000-D2, Trent 1000-E2, Trent 1000-G2, Trent 1000-H2, Trent 1000-J2, Trent 1000-K2, and Trent 1000-L2 turbofan engines.

(d) Subject

Joint Aircraft System Component (JASC) Code 7230, Turbine Engine Compressor Section.

(e) Unsafe Condition

This AD was prompted by reports of intermediate-pressure compressor (IPC) rotor blade separations resulting in engine failures. We are issuing this AD to prevent

failure of the IPC. The unsafe condition, if not addressed, could result in failure of one or more engines, loss of thrust control, and loss of the airplane.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Required Actions

(1) Inspect the IPC stage 1 rotor blades before exceeding the applicable initial inspection thresholds specified in Table 1 of RR Alert Non-Modification Service Bulletin (NMSB) Trent 1000 72-AK060, dated April 13, 2018, or within 80 flight cycles (FCs) after the effective date of this AD, whichever occurs later. If Direct Accumulation Count cycles, as specified in Table 1 of RR Alert NMSB Trent 1000 72-AK060, are not available, then use FCs, regardless of Engine Health Monitoring alerts. Thereafter at intervals not to exceed 200 FCs, repeat the inspection of the IPC stage 1 rotor blades. Use the Accomplishment Instructions, paragraph 3.A., of RR Alert NMSB Trent 1000 72-AK060, dated April 13, 2018 to perform the inspections.

(2) Perform an initial inspection of the IPC stage 2 rotor blades and IPC shaft stage 2 dovetail posts, using the Accomplishment Instructions, paragraph 3.B., of RR Alert NMSB Trent 1000 72-AK060, dated April 13, 2018. Perform the initial inspection based on engine operations as specified in the following paragraphs and within the following compliance times:

(i) For engines with less than 300 FCs since new on the effective date of this AD:

(A) For engines that are not operated on ETOPS (extended operations) flights, prior to exceeding 300 FCs or within 50 days after the effective date of this AD, whichever occurs later.

(B) For engines that are operated on ETOPS flights, before exceeding 300 FCs or before the next ETOPS flight, whichever occurs later.

(ii) For engines with 300 or more FCs since new on the effective date of this AD:

(A) For engines that are not operated on ETOPS flights, prior to exceeding 50 days after the effective date of this AD or within 80 FCs since the last inspection performed in accordance with RR Alert NMSB Trent 1000 72-AJ819, whichever occurs later. This inspection is not to exceed 200 FCs since the previous inspection.

(B) For engines that are operated on ETOPS flights, before the next ETOPS flight, or within 80 FCs since the last inspection performed in accordance with RR Alert NMSB Trent 1000 72-AJ819, whichever occurs later.

(3) Thereafter, at intervals not to exceed 80 FCs, repeat the inspections of the IPC stage 2 rotor blades and IPC shaft stage 2 dovetail posts required by paragraph (g)(2) of this AD. Use the Accomplishment Instructions, paragraph 3.B., of RR Alert Trent 1000 72-AK060, dated April 13, 2018, to perform these inspections.

(4) For engines involved in ETOPS operations, inspect the rear face of IPC stage 2 rotor blades, part number KH25730, at each inspection interval defined in paragraph (g)(3) of this AD in accordance with the Accomplishment Instructions, paragraph 3.C., of RR Alert Trent 1000 72-AK060, dated April 13, 2018.

(5) As of the effective date of this AD, before the next flight after each occurrence where engine operation in asymmetric power conditions was sustained for more than 30 minutes at less than 25,000 feet, either resulting from engine power reduction, or from engine in-flight shut-down (IFSD), perform an on-wing borescope inspection of the IPC stage 2 rotor blades and IPC shaft stage 2 dovetail posts on the unaffected engine (no power reduction, no IFSD) installed on the airplane. Use the Accomplishment Instructions, either paragraph 3.B. for engines not involved in ETOPS operations, or paragraphs 3.B. and 3.C. for engines involved in ETOPS operations, of RR Alert NMSB Trent 1000 72-AK060, dated April 13, 2018, to perform this inspection.

(6) If any IPC stage 1 rotor blade, IPC stage 2 rotor blade, or an IPC shaft stage 2 dovetail post is found cracked during any inspection required by this AD, replace the part with a part eligible for installation before further flight.

(h) Definitions

For the purpose of this AD, flight cycles indicated in paragraph (g)(1) of this AD are those accumulated by the engine. FCs indicated in paragraph (g)(2) of this AD are those accumulated by each affected IPC stage 2 rotor blade since first installation on an engine. If FCs accumulated by an affected IPC stage 2 rotor blade are unknown, then engine FCs since new apply.

(i) Credit for Previous Actions

(1) If you performed the initial inspections required by paragraph (g) of this AD before the effective date of this AD, using any of the following you met the initial inspection requirements of paragraph (g) of this AD; however, all of the repetitive actions still apply:

(i) RR Alert NMSB Trent 1000 72-AJ814, Initial Issue, dated August 17, 2017, or Revision 1, dated September 26, 2017; or

(ii) RR Alert NMSB Trent 1000 72-AK058, Initial Issue, dated March 30, 2018;

(iii) RR NMSB Trent 1000 72-AJ819, Revision 1, October 9, 2017, or Initial Issue, dated August 17, 2017.

(2) Reserved.

(j) Special Flight Permits

(1) Special flight permits, as described in Section 21.197 and Section 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199), are subject to the requirements of paragraph (j)(1)(i) of this AD.

(i) Operators who are prohibited from further flight due to an IPC stage 1 rotor blade, IPC stage 2 rotor blade, or an IPC shaft stage 2 dovetail post being found cracked,

may perform a one-time non-revenue ferry flight to a location where the engine can be removed from service. This ferry flight must be performed without passengers, involve non-ETOPS operation, and consume no more than three FCs.

(ii) Reserved.

(2) Reserved.

(k) Alternative Methods of Compliance (AMOCs)

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in paragraph (l)(1) of this AD. You may email your request to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

(l) Related Information

(1) For more information about this AD, contact Kevin M. Clark, Aerospace Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: 781-238-7088; fax: 781-238-7199; email: kevin.m.clark@faa.gov.

(2) Refer to European Aviation Safety Agency (EASA) AD 2018-0084, dated April 13, 2018, for more information. You may examine the EASA AD in the AD docket on the Internet at <http://www.regulations.gov> by searching for and locating it in Docket No. FAA-2018-0314.

(m) Material Incorporated by Reference

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this service information as applicable to do the actions required by this AD, unless the AD specifies otherwise.

(i) Rolls-Royce plc (RR) Alert Non-Modification Service Bulletin (NMSB) Trent 1000 72-AJ819, Revision 2, dated April 12, 2018.

(ii) RR Alert NMSB Trent 1000 72-AK060, Initial Issue, dated April 13, 2018.

(3) For RR service information identified in this AD, contact Rolls-Royce plc, Corporate Communications, P.O. Box 31, Derby, England, DE24 8BJ; phone: 011-44-1332-242424; fax: 011-44-1332-249936; email: corporate.care@rolls-royce.com; Internet: <https://customers.rolls-royce.com/public/rollsroycecare>.

(4) You may view this service information at FAA, Engine & Propeller Standards Branch, 1200 District Avenue, Burlington, MA. For information on the availability of this material at the FAA, call 781-238-7759.

(5) You may view this service information that is incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: <http://www.archives.gov/federal-register/cfr/ibr-locations.html>.

Issued in Burlington, Massachusetts, on April 19, 2018.

Karen M. Grant,
Acting Manager, Engine and Propeller Standards Branch,
Aircraft Certification Service.

